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AUTHOR Stolworthy, Reed L.
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ABSTRACT

A study of preservice student teachers involved 19 undergraduates certified to teach mathematics by the Washburn University (Kansas) teacher preparation program from fall 1984 to fall 1989. The study examined their ability to transmit knowledge of the subject to students through methodologies designed to translate theory into practice. The respective cooperating teachers (n=18) provided data regarding each student teacher's abilities, and the student teachers provided data by using the same evaluative device for assessing their own abilities in secondary school mathematics. Evaluations were made relative to their knowledge of the subject areas of trigonometry, business applications, analytic geometry, modern math, algebra, geometry, and arithmetic. The evaluations also looked at their ability to transmit subject matter to students using lectures, demonstrations, models, data analysis, and simulations. A third part of the evaluation measured their ability to translate theory into practice by providing projects, simulations, clear procedures, fully-explained results, and well-explained applications. Each evaluative instrument was based on a rating scale of 1-5. Data analysis indicated that the student teachers tended to rate themselves slightly higher than did the cooperating teachers. The cooperating teachers had a smaller standard deviation than did the student teachers. The 20 tables and the evaluative instruments are appended. (SM)

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METHODOLOGICAL APPLICATIONS OF THEORY TO
PRACTICE BY PRESERVICE SECONDARY SCHOOL
MATHEMATICS TEACHERS

SUBMITTED BY

DR. REED L. STOLWORTHY
ASSOCIATE PROFESSOR OF EDUCATION
WASHBURN UNIVERSITY

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METHODOLOGICAL APPLICATIONS OF THEORY TO PRACTICE BY PRESERVICE SECONDARY SCHOOL MATHEMATICS TEACHERS

This study of preservice student teachers involved a population of 19 ($n = 19$) undergraduates certified to teach mathematics by Washburn University's teacher preparation program from the Fall Semester of 1984 through Fall Semester 1989. The respective cooperating teachers involved in the study ($n = 18$) provided data regarding the abilities demonstrated by the student teachers. The student teachers also provided data by using the same evaluative device designed for assessing their own abilities in the secondary school subject fields of mathematics.

Problem Statement

The purpose of this study was to determine the preservice secondary school mathematics teachers' ability to transmit knowledge of subject to students through methodologies designed to translate theory into practice. Answers were sought to the following questions:

1. What were the perceptions relative to the student teachers' knowledge of the respective subject areas in mathematics?
2. To what extent were different teaching methods effectively used in transmitting the subject to the students?
3. How successful were the student teachers in translating mathematical theories into practice?

Research Design

Each evaluative instrument utilized in the study was based on a rating scale of 1 to 5, with 1 indicating incompetence and 5 indicating total competence. The respondents were to check the column labeled NA if they did not observe the undergraduate in a particular competency (Appendix E).

The cooperating teachers involved in the study provided data regarding the abilities demonstrated by the student teachers. The student teachers also provided data by using the same evaluative device designed for assessing their own abilities in the subject fields of mathematics.

Evaluations were made by the two groups mentioned above relative to the preservice teachers' knowledge of the subject areas of trigonometry, business applications, analytic geometry, modern math, algebra, geometry and arithmetic. The second area of the instrument dealt with the student teachers' ability to transmit subject matter to the students by using lectures, demonstrations, models, data analysis, and simulations. The third and last part of the rating instrument measured the student teachers' ability to translate theory into practice through well designed projects, simulations, administering clear procedures, providing fully-explained results, and well explained applications.

The data obtained from the above respondents at the end of student teaching was tabulated and analyzed on the computer.

The quantitative results were expressed through descriptive and inferential statistics.

It can readily be noticed that the left hand column of tables 1 through 17 (Appendix A) lists the numbers on the rating scale with 1 indicating incompetence and 5 indicating total competence. In addition, the respondents were to check NA if they did not observe the undergraduate in a particular competency. The numbers listed across the tables indicate the frequency of responses received at each of the points on the rating scale by each of the respective groups. The mean values and standard deviations pertaining to each of the competencies are listed at the bottom of each table.

The Mean and Standard Deviation

Tables 1 through 17 (Appendix A) also shows the mean scores and standard deviations for the seventeen abilities related to teaching as represented by the student teachers from Fall Semester 1984 through Fall Semester 1989.

The Percentile Rank

In order to determine the position of each derived Mean value, the percentile rank was determined. The percentile rank shows the relative position of each case in the distribution, expressed in terms of the ordinal number corresponding to the centile interval in which the case is

placed. The rank order shows the distribution of the series of assessments that have been arranged according to their relative magnitudes or positions, that is, from highest to lowest in the series.

Table 18 (Appendix B) shows the ranking of the mean values derived through the application of descriptive statistics to the data obtained from the respondents. It can readily be noted that the highest mean values obtained from the cooperating teachers were in the area dealing with the student teachers' knowledge of the subject areas of arithmetic (mean = 4.83) (P.R. = 97.06). This ranking was followed relatively closely by analytic geometry (mean = 4.67) (P.R.= 82.35), algebra (mean = .67) (P.R.= 82.35) trigonometry (mean = 4.40) (P.R. = 32.35), geometry (mean = 4.64) (P.R.= 73.53), and modern math (mean = 4.43) (P.R.=38.24). The smallest mean value and percentile ranking was in business applications (mean = 4.20) (P.R.= 8.82). A rating of 5.00 on any of the above would infer total competence. Table 18 also depicts the abilities relative to transmitting the subject to the students through the application of different teaching methods. According to the perceptions of the cooperating teachers, the strongest teaching ability was illustrated through the student teachers' use of models in transmitting the subject to the students (mean = 4.45) (P.R.= 61.76). This mean value and percentile rank was followed very closely by the student

teachers' ability to use demonstrations (mean = 4.44) (P.R. = 50.00) and in using simulations (mean = 4.44) (P.R. = 50.00). Another relatively close mean value was in using data analysis (mean = 4.38) (P.R. = 26.47). The smallest mean value derived was relative to the use of the lecture as a teaching method for transmitting the subject to the students (mean = 4.18) (P.R. = 2.94). In addition, Table 18 provides insights regarding the student teachers' ability to translate theory into practice. Using well designed simulations was regarded as the student teachers' strongest ability in translating theory into practice (mean = 4.70) (P.R. = 91.18). This ability was closely followed in using well-designed projects (mean = 4.58) (P.R. = 67.25). Other abilities demonstrated were the ability to explain the applications of the theory to practice (mean = 4.44) (P.R. = 50.00) and in using clear procedures (mean = 4.33) (P.R. = 20.59). The smallest mean value (mean = 4.29) (P.R. = 14.71) was relative to the ability to use fully-explained results in translating the respective theories into practice.

Table 19 (Appendix C) illustrates the ranking of the mean values as related to the student teachers' self-evaluation. The mean values depict the student teachers as perceiving themselves as being most knowledgeable in the subject area of arithmetic (mean = 5.00) (P.R. = 94.12) and analytic geometry (mean = 5.00) (P.R. = 94.12). Algebra also had a high mean value (4.82)

(P.R. = 85.29), as did geometry (mean = 4.64) (P.R. = 61.76), business applications (mean = 4.50) (P.R. = 50.00), and modern math (mean = 4.41) (P.R. = 44.12). The smallest mean value derived was relative to the student teachers knowing the subject field of trigonometry (mean = 4.25) (P.R. = 5.88). Table 19 also dealt with the student teachers' ability relative to transmitting the subject to the student through the use of different teaching methods. It can readily be noticed that the highest mean value derived concerning a teaching method was through the use of demonstrations (mean = 4.71) (P.R. = 79.41). This was closely followed by the ability to transmit the subject to the student through the use of lectures (mean = 4.69) (P.R. = 73.53), the use of models (mean = 4.64) (P.R. = 61.76), and the use of simulations (mean = 4.33) (P.R. = 26.47). The smallest mean value was in the use of data analysis (mean = 4.30) (P.R. = 20.59).

Table 19 further shows the students teachers' ability to translate theory into practice through the use of various approaches. The use of well explained applications (mean = 4.40) (P.R. = 35.29) and clear procedures (mean = 4.40) (P.R. = 35.29) had the highest mean values. This was followed by using well-designed projects (mean = 4.29) (P.R. = 14.71) and in the ability to use well-designed simulations (mean = 4.25) (P.R. = 5.88)

A mean value of 5.00 would infer total competence in the abilities mentioned above.

The Chi-Square

Since the chi-square has been considered as either a parametric or non-parametric statistic; it is a test of significance appropriate in inferential statistics for such nominal data as head counts or frequency counts. Conceptually, a chi-square test compares the observed frequencies with the expected frequencies to determine if they are significantly different from each other.

Table 20 (Appendix D) illustrates the frequency of the evaluative responses which occurred at each level of the rating scale relative to the two groups of evaluators.

The chi-square was applied to determine the significance of the differences between the frequencies of occurrence of a rating received at each point on the rating scale (Chi-Square = 10.34). In examining the Chi-Square Table of Critical Values relative to the chi-square value of 10.34 with 4 degrees of freedom, it was specified that the score has a probability level of significance at .05. For the purposes of this study, the probability level of .05 was selected as the desired level of significance. Since the probability level .05 was selected as the level of significance, then any value greater than 5 percent would mean that the data had not obtained statistical significance. Thus, the probability is fewer than five times out of one hundred that the obtained results were due to chance or error. In other words, if the study was conducted 100 times, the same differences between the groups would be attributed to significant differences 95 times out

of hundred. However, five times out of a hundred ($p < .05$), those differences would be attributed to chance or error.

Table 20 depicts the frequency of the evaluative responses made by the cooperating teachers and the student teachers at each level of the rating scale. This data was used in calculating the chi-square to determine the degree of significant differences in the responses made by the two groups assessing the abilities related to teaching secondary school mathematics.

The total mean value for each of the respective groups relative to all of the seventeen Mean values indicate that the student teachers tended to rate themselves slightly higher (mean = 4.56) than did the cooperating teachers (mean = 4.47). The cooperating teachers also had a smaller standard deviation (S.D. = .176) than did the student teachers (S.D. = .237).

All of the evaluations made by the two groups had mean values which ranged from the smallest mean of 4.18 to the highest mean 5.00. The rating scale applied by the respondents in this study used a scale which ranged from 1 to 5 with 1 indicating incompetence and 5 indicating total competence.

The chi-square was applied to determine the significance of the differences between the frequencies of occurrence of a rating received at each point on the rating scale by the two groups of evaluators. The chi-square score obtained was 10.34 with a probability level of significance at .05. Thus, the probability is fewer than five times out of one hundred that the obtained results were due to chance or error.

Conclusion

The cooperating teachers involved in this study provided data regarding the teaching abilities demonstrated by the student teachers through responding to a rating scale. The student teachers also provided data by responding to the same instrument.

The self-evaluation applied by the student teachers had higher mean values derived on nine of the seventeen abilities. Those higher mean values pertained to the preservice teachers' knowledge of business applications, analytic geometry, algebra and arithmetic; and the ability to transmit subject to students using lectures and demonstrations; and the ability to translate theory into practice through using clear procedures and results that were fully explained. In comparison, there were seven instances when the highest mean values were derived from the ratings provided by the cooperating teachers. Those respective ratings pertained to the preservice teachers' abilities as related to knowledge of trigonometry and modern math; ability to transmit the subject to students using data analysis, and simulations; and the ability to translate theory into practice with well-designed projects, and simulations; and applications that were explained. The same mean value was derived relative to assessing the student teachers' knowledge of geometry.

APPENDIX A
TABLES 1-17
THE MEAN AND STANDARD DEVIATION

TABLE 1PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 1-KNOWLEDGE OF TRIGONOMETRY

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-89 N=19
1	0	0
2	1	0
3	0	1
4	0	4
5	4	3
Competent		
NA	13	11
Mean	4.40	4.25
Standard Deviation	1.34	0.71

TABLE 2PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 2-KNOWLEDGE OF BUSINESS APPLICATIONS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	0
3	0	0
4	1	4
5	3	4
Competent		
NA	13	11
Mean	4.20	4.50
Standard Deviation	1.30	0.53

TABLE 3PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 3-KNOWLEDGE OF ANALYTIC GEOMETRY

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	0	0
3	0	0
4	1	0
5	2	4
Competent		
NA	15	15
Mean	4.67	5.00
Standard Deviation	0.58	0.00

TABLE 4PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 4-KNOWLEDGE OF MODERN MATH

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	0
3	0	0
4	1	2
5	5	5
Competent		
NA	11	12
Mean	4.43	4.41
Standard Deviation	1.13	0.49

TABLE 5PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 5-KNOWLEDGE OF ALGEBRA

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	0
3	0	0
4	2	3
5	12	14
Competent		
NA	3	2
Mean	4.67	4.82
Standard Deviation	0.87	0.39

TABLE 6PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 6-KNOWLEDGE OF GEOMETRY

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	0
3	0	1
4	1	2
5	9	8
Competent		
NA	7	8
Mean	4.64	4.64
Standard Deviation	0.92	0.67

TABLE 7PART A-KNOWLEDGE OF SUBJECT AREAQUESTION 7-KNOWLEDGE OF ARITHMETIC

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	0	0
3	1	0
4	0	0
5	11	17
Competent		
NA	6	2
Mean	4.83	5.00
Standard Deviation	0.58	0.00

TABLE 8PART B-ABILITY TO TRANSMIT SUBJECTQUESTION 8-ABILITY TO TRANSMIT SUBJECT TO STUDENTS USING
LECTURES

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	1	0
2	1	0
3	1	0
4	5	7
5	9	11
Competent		
NA	1	1
Mean	4.18	4.69
Standard Deviation	1.19	0.50

TABLE 9PART B-ABILITY TO TRANSMIT SUBJECTQUESTION 9-ABILITY TO TRANSMIT SUBJECT TO STUDENTS USING
DEMONSTRATIONS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	0
3	2	0
4	3	5
5	12	12
Competent		
NA	0	2
Mean	4.44	4.71
Standard Deviation	0.92	0.47

TABLE 10PART B-ABILITY TO TRANSMIT SUBJECTQUESTION 10-ABILITY TO TRANSMIT SUBJECT TO STUDENTS USING
MODELS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	0	0
3	1	1
4	4	2
5	6	8
Competent		
NA	7	8
Mean	4.45	4.64
Standard Deviation	0.69	0.67

TABLE 11PART B-ABILITY TO TRANSMIT SUBJECTQUESTION 11-ABILITY TO TRANSMIT SUBJECT TO STUDENTS USING
DATA ANALYSIS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	1
3	0	0
4	2	4
5	5	5
Competent		
NA	10	9
Mean	4.38	4.30
Standard Deviation	1.06	0.95

TABLE 12PART B-ABILITY TO TRANSMIT SUBJECTQUESTION 12-ABILITY TO TRANSMIT SUBJECT TO STUDENTS USING
SIMULATIONS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	0	1
3	1	0
4	3	5
5	5	6
Competent		
NA	9	7
Mean	4.44	4.33
Standard Deviation	0.73	0.89

TABLE 13

PART C-ABILITY TO TRANSLATE THEORY INTO PRACTICEQUESTION 13-ABILITY TO TRANSLATE THEORY INTO PRACTICEWITH WELL-DESIGNED PROJECTS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	0	1
3	2	2
4	1	3
5	9	8
Competent		
NA	6	5
Mean	4.58	4.29
Standard Deviation	0.79	0.99

TABLE 14PART C-ABILITY TO TRANSLATE THEORY INTO PRACTICEQUESTION 14-ABILITY TO TRANSLATE THEORY INTO PRACTICE WITH
WELL DESIGNED SIMULATIONS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	0	0
3	1	3
4	1	3
5	8	6
Competent		
NA	8	7
Mean	4.70	4.25
Standard Deviation	0.67	0.87

TABLE 15PART C-ABILITY TO TRANSLATE THEORY INTO PRACTICEQUESTION 15-ABILITY TO TRANSLATE THEORY INTO PRACTICETHROUGH CLEAR PROCEDURES

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	2	0
3	0	2
4	6	5
5	10	8
Competent		
NA	0	4
Mean	4.33	4.40
Standard Deviation	0.97	0.74

TABLE 16PART C-ABILITY TO TRANSLATE THEORY INTO PRACTICEQUESTION 16-ABILITY TO TRANSLATE THEORY INTO PRACTICE WITH
FULLY EXPLAINED RESULTS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	1	0
2	1	0
3	0	1
4	5	3
5	10	10
Competent		
NA	1	5
Mean	4.29	4.64
Standard Deviation	1.16	0.74

TABLE 17PART C-ABILITY TO TRANSLATE THEORY INTO PRACTICEQUESTION 17-ABILITY TO TRANSLATE THEORY INTO PRACTICE WITH
WELL EXPLAINED APPLICATIONS

Incom- petent	Cooperating Teachers 1984-1989 N=18	Student Teachers 1984-1989 N=19
1	0	0
2	1	0
3	1	2
4	4	5
5	10	8
Competent		
NA	2	4
Mean	4.44	4.40
Standard Deviation	0.89	0.74

APPENDIX B

TABLE 18

THE RANKING OF MEAN VALUES DERIVED FROM THE COOPERATING TEACHERS'
EVALUATION OF STUDENT TEACHERS IN THE FIELD OF MATHEMATICS FROM
FALL, 1984 THROUGH FALL, 1989

TABLE 18

RANKING OF MEAN VALUES DERIVED FROM THE COOPERATING TEACHERS'
EVALUATION OF STUDENT TEACHERS IN THE FIELD OF MATHEMATICS FROM FALL,
1984 - FALL, 1989

Competency of Preservice Teacher	Mean Value N=18	Percentile Rank of Mean Value
Part A- Knowledge of Subject Area:		
1. Trigonometry	4.40	32.35
2. Business Applications	4.20	8.82
3. Analytic Geometry	4.67	82.35
4. Modern Math	4.43	38.24
5. Algebra	4.67	82.35
6. Geometry	4.64	73.53
7. Arithmetic	4.83	97.06
Part B-Ability to Transmit Subject to Students Using:		
8. Lectures	4.18	2.94
9. Demonstrations	4.44	50.00
10. Models	4.45	61.76
11. Data Analysis	4.38	26.47
12. Simulations	4.44	50.00
Part C- Ability to Translate Theory Into Practice:		
13. Are Projects Well-Designed	4.58	67.65
14. Are Simulations Well-Designed	4.70	91.18
15. Are Procedures Clear	4.33	20.59
16. Are Results Fully-Explained	4.29	14.71
17. Are Applications Explained	4.44	50.00

Scale for Mean Values: 5.00 = total competence; 1.00 = incompetence

APPENDIX C
TABLE 19

THE RANKING OF MEAN VALUES DERIVED FROM THE SELF-EVALUTION OF
STUDENT TEACHERS IN THE FIELD OF MATHEMATICS FROM FALL, 1984
THROUGH FALL, 1989

TABLE 19

RANKING OF MEAN VALUES DERIVED FROM THE SELF-EVALUATION OF STUDENT
TEACHERS' IN THE FIELD OF MATHEMATICS FROM FALL, 1984 - FALL, 1989

Competency of Preservice Teacher	Mean Value N=19	Percentile Rank of Mean Value
Part A- Knowledge of Subject Area:		
1. Trigonometry	4.25	5.88
2. Business Applications	4.50	50.00
3. Analytic Geometry	5.00	94.12
4. Modern Math	4.41	44.12
5. Algebra	4.82	85.29
6. Geometry	4.64	61.76
7. Arithmetic	5.00	94.12
Part B-Ability to Transmit Subject to Students Using:		
8. Lectures	4.69	73.53
9. Demonstrations	4.71	79.41
10. Models	4.64	61.76
11. Data Analysis	4.30	20.59
12. Simulations	4.33	26.47
Part C- Ability to Translate Theory Into Practice:		
13. Are Projects Well-Designed	4.29	14.71
14. Are Simulations Well-Designed	4.25	5.88
15. Are Procedures Clear	4.40	35.29
16. Are Results Fully-Explained	4.64	61.76
17. Are Applications Explained	4.40	35.29
Scale for Mean Values: 5.00 = total competence; 1.00 = incompetent		

APPENDIX D
TABLE 20
FREQUENCY OF RESPONSE TO NUMERICAL POSITION ON RATING SCALE BY
COOPERATING TEACHERS AND STUDENT TEACHERS

TABLE 20

FREQUENCY OF RESPONSE TO NUMERICAL POSITIONS ON RATING SCALE
BY COOPERATING TEACHERS AND STUDENT TEACHERS IN
MATHEMATICS FROM FALL SEMESTER 1984 THROUGH
FALL SEMESTER 1989

	Rating Scale = (1)	(2)	(3)	(4)	(5)
Cooperating Teachers'					
Frequency of Response =	2	12	10	40	130
Student Teachers'					
Frequency of Response =	0	3	13	57	137
Total =	2	15	23	97	267
Chi-Square = 10.34					
p = <.05 level of significance					

APPENDIX E
EVALUATIVE INSTRUMENTS

TEACHING FIELD: MATHEMATICS

(Completed by the Cooperating Teacher)

DIRECTIONS: Rate the Student Teacher's performance on the following items. Use a scale of 1 to 5, with 1 indicating incompetence and 5 indicating total competence. Check the column labeled NA if you did not observe the student teacher in a particular competency.

A. Knowledge of subject area	1	2	3	4	5	NA
1. Trigonometry	—	—	—	—	—	—
2. Business Applications	—	—	—	—	—	—
3. Analytic Geometry	—	—	—	—	—	—
4. Modern Math	—	—	—	—	—	—
5. Algebra	—	—	—	—	—	—
6. Geometry	—	—	—	—	—	—
7. Arithmetic	—	—	—	—	—	—
B. Ability to transmit subject to students using	1	2	3	4	5	NA
8. Lectures	—	—	—	—	—	—
9. Demonstrations	—	—	—	—	—	—
10. Models	—	—	—	—	—	—
11. Data Analysis	—	—	—	—	—	—
12. Simulations	—	—	—	—	—	—
C. Ability to translate theory into practice	1	2	3	4	5	NA
13. Are projects well-designed	—	—	—	—	—	—
14. Are simulations well-designed	—	—	—	—	—	—
15. Are procedures clear	—	—	—	—	—	—
16. Are results fully-explained	—	—	—	—	—	—
17. Are applications explained	—	—	—	—	—	—

TEACHING FIELD: MATHEMATICS
(COMPLETED BY STUDENT TEACHER)

DIRECTIONS: In order to evaluate your performance during student teaching, please rate your competence on the following items. Use a scale of 1 to 5, with 1 indicating incompetence and 5 indicating total competence. Check the column labeled NA if you did not perform a particular competency.

A. Knowledge of subject area	1	2	3	4	5	NA
1. Trigonometry	—	—	—	—	—	—
2. Business Applications	—	—	—	—	—	—
3. Analytic Geometry	—	—	—	—	—	—
4. Modern Math	—	—	—	—	—	—
5. Algebra	—	—	—	—	—	—
6. Geometry	—	—	—	—	—	—
7. Arithmetic						
B. Ability to transmit subject to students using	1	2	3	4	5	NA
8. Lectures	—	—	—	—	—	—
9. Demonstrations	—	—	—	—	—	—
10. Models	—	—	—	—	—	—
11. Data Analysis	—	—	—	—	—	—
12. Simulations	—	—	—	—	—	—
C. Ability to translate theory into practice	1	2	3	4	5	NA
13. Are projects well-designed	—	—	—	—	—	—
14. Are simulations well-designed	—	—	—	—	—	—
15. Are procedures clear	—	—	—	—	—	—
16. Are results fully-explained	—	—	—	—	—	—
17. Are applications explained	—	—	—	—	—	—